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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

KETTUNEN

Serial No. **09/533,904**

Filed: **March 21, 2000**

For: **COOKING CELLULOSE MATERIAL USING HIGH
ALKALI CONCENTRATIONS AND/OR HIGH PH NEAR
THE END OF THE COOK**



Atty. Ref.: **10-1304**

Group: **1731**

Examiner: **Nguyen**

RECEIVED

DEC 21 2000

TC 1700

December 18, 2000

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

REQUEST FOR RECONSIDERATION

Responsive to the Official Action dated August 16, 2000 (for which petition is hereby made for a one month extension of time), please consider the following:

REMARKS

It is respectfully submitted that the declaration does not fail to comply with the requirements of 37 CFR 1.175(a) as alleged in paragraph 1 on page 2 of the Action, as an inspection of paragraphs 4 and 5 of declaration make clear.

With respect to paragraph 2 on page 2 of the Action, apparently the Patent and Trademark Office has lost the consent of the assignee to reissue. Another copy of that paper, executed on March 16, 2000 and filed with this reissue application on March 21, 2000, is enclosed herewith.

Reconsideration is respectfully requested of the rejection of all of the claims under 35 USC §112, first paragraph, and under 35 USC §251 (the rejections being

identical and merely applying different sections of the statute). It is respectfully submitted that the original application in this case clearly and unequivocally specifically and/or inherently supports what is recited in claims 22 through 46, which have been copied from U.S. patent 5,885,414. Figure 1 of the '414 patent illustrates the same high alkalinity EMCC® process that is described in column 6, line 17 through column 7, line 2, and described in column 3, line 43 through column 4, line 67 thereof, of the instant application specification (the '856 patent). Both describe a digester having a co-current first treatment zone at relatively low alkalinity (B in '414) followed by a counter-current treatment zone at relatively high alkalinity (C in '414). At column 6, lines 31-35 in the '856 patent of Kettunen, the alkalinity of the liquor in the second counter-current zone is specified as "more than 15 g/l, preferably more than 20 g/l and most preferably more than 25 g/l." Though the alkalinity of the liquor in the first "low alkali" stage that would be used before the treatment described in column 6, lines 17+ of the '856 patent is not expressly discussed in this section, it is clear from the discussion immediately before this section (that is, column 5, line 52 through column 6, line 16) that the alkalinity of the liquor at the end of the previous stage would be "about 10 g/l or less" (column 5, line 62). Thus, assuming a second stage treatment alkali content of at least 20 g/l and a first stage treatment alkali content of at least 10 g/l in the '856 patent (this reissue application), the concentration of the treatment liquor in the second stage of this reissue application is clearly at least "about 8 grams/liter ... greater than the first effective alkali concentration" as claimed in the '414 patent.

It is also respectfully pointed out that claim 1 of the '856 patent (this application) reads on claim 1 of the '414 patent. Since claim 1 of the '856 patent (which is supported by column 4, line 58 through column 5, line 51 of the specification) states that the cooking zone is at least 30 minutes long, and that the last minute is practiced at high alkali, this implies that at least the first about 29 minutes are performed at low alkali. That is a two stage, low-then-high, alkali process as specifically set forth in claim 1 of the '856 patent.

With respect to the suggestion in the previous Action that the disclosure of the '856 patent (this application) does not support the "supplying a first portion ..." and "supplying a second portion ..." limitations of the '414 patent, it is inappropriate to merely analogize one of the figures of the '414 patent to one of the figures (figure 2) of the '856 patent. There is no requirement for the present reissue application of the '856 patent to have support in the drawings for what is claimed in the '414 patent. All that is necessary is the disclosure be somewhere in this application, and a disclosure in the specification alone can suffice.

Apparently from sub-paragraph 1) of the previous Action it is believed that the "supplying" limitations are not shown because figure 2 of the '856 patent does not show an intermediate introduction of cooking liquor, such as the transfer circulation provided by conduits 27 and 30 of the '414 patent. Whether exactly the same conduits are illustrated is unimportant, however. Also, an intermediate introduction of cooking liquor which is alleged to be missing in figure 2 of the instant application is clearly shown by the conduit 518 in figure 14.

Though this reissue application does not provide cooking liquor to the top of the impregnation vessel (IV) 1 via conduit 30 or to the slurry leaving the IV via conduit 27 in the embodiment shown in figure 2, the disclosure in this reissue application is still "supplying a first portion of the total amount of the cooking liquor to the impregnation zone and the first cooking zone" by introducing cooking chemical to conduit 16 via conduits 49 and 38 *and* via conduits 45 and 48. (That is, the residual recirculated spent liquor from screen 40 is introduced to the feed system to provide some of "the total amount of cooking liquor required for the cooking reaction".) This cooking liquor which is provided by this reissue application to conduit 16 is introduced to the chips in chute 13 and the slurry of chips and cooking liquor are transferred to the IV via conduit 18. This same cooking liquor is carried by the slurry to treatment step I, that is, "impregnation" in vessel 13', and to treatment step II (misabeled I in figure 2) "cooking" in vessel 133. Note that in this reissue application's figure 2, no other cooking liquor is introduced to the system until the "second portion" is introduced via conduit 137. This indicates that the cooking liquor supplied to the feed system must also be present in the impregnation stage and the initial cooking stage. This cooking liquor must be present in these stages or the process becomes inoperable. Therefore, the "first potion" of the cooking liquor introduced to the feed system must also be supplied "to the impregnation zone and the first cooking zone."

Clearly this reissue application's treatment step I is the claimed "impregnation zone" and treatment step II is the claimed "first cooking zone". At column 12, lines 54-59, this reissue application describes the treatment zone I:

After presteaming in vessel 12, the cellulose material is treated with cooking liquor in a long, cool impregnation or pretreatment stage. This treatment, in zone I, is typically at between about 80° and 110°C, preferably between 95° and 105°C, for one-half to six hours, preferably, one-three hours. [Emphasis added.]

Treatment step II is described with respect to figure 1 at column 9, lines 26-32:

In the counter-current heating and impregnation zone II, the down-flowing, impregnated chips are heated by means of hotter cooking liquor drawn upward by means of screens 24 and 25. This liquor is typically heated by means of circulation 28 to a temperature of 120° to 160°C, typically 130° to 150°C, preferably 135° to 145°C. [Emphasis added.]

Though this reissue application describes treatment step II with respect to Figure 1, it also notes at column 12, lines 42-44 that:

FIG. 2 illustrates the implementation of the processes illustrated in FIG. 1 into an existing two -vessel digester system.

Furthermore, though this reissue application calls its step II an "impregnation", clearly more than simply pretreatment of chips is occurring. As noted below, at treatment temperatures greater than 140°C "cooking", regardless of what it is called, is clearly taking place. The presence of the state of "cooking" is even more evidenced by the presence of temperatures between 150° and 160°C. This reissue application clearly specifies such temperatures in its description of its treatment step II. Clearly, treatment B described with regard to figure 1 of the '414 patent is essentially identical to the treatment step II of this reissue application's figure 2.

With respect to sub-paragraph 2) of the Office Action, it is alleged that the treatment zone II, which is at 120-160°C, of the reissue application cannot be considered equivalent to zone B (at 150-170°C) of the '414 patent, and says that the

range in this reissue application "appears to be below the conventional cooking temperature of 150-170°C". However it is respectfully pointed out that 160°C, the upper temperature of the range in this reissue application, is right in the middle of the 150-170°C range in the '414 patent. Thus for this reason alone this application clearly supports the claims copied from the '414 patent.

Secondly, the suggestion that the treatment range according to this reissue application is below the conventional cooking temperature range is incorrect. Those of ordinary skill in the art know that conventional cooking temperatures for kraft cooking, for example, vary broadly depending upon the wood species, chemical charge, and time, among other things, and can vary from as low as 140°C to as high as 180°C. For example, on page 49 of Grace, copy enclosed, (before discussion of H-factor) in the second paragraph in the lefthand column, the author states "Cellulose removal starts at 120-130°C ..." Clearly even at these lower temperatures some "cooking" is occurring. On page 71 of his Handbook for Pulp & Paper Technologists, (copy enclosed) lefthand column, second paragraph, Smook defines the "normal cooking temperature range" as 155-175°C, again, beyond the range identified in the previous Action. Furthermore, recent developments in the art, for example, Andritz-Ahlstrom's Lo-Solids® Cooking and EAPC® Cooking processes (the latter of which is the subject of this application), have reduced "conventional cooking temperature" down to as low as 140°C. Thus, the definition of "conventional cooking temperature" varies with advances in technology.

The temperature range specified by this reissue application clearly overlaps the limited range of "cooking" temperature set forth in the Action, and is clearly within the

more accurate range from 140-180°C range of "cooking temperature" recognized in the conventional art. Clearly the claimed treatment zone II of this reissue application corresponds to the cooking stage B of the '414 patent.

It is respectfully submitted that the first paragraph on page 3 of the Action also misinterprets what is presented in figure 10 of this reissue application (corresponding to the '856 patent), and when the proper understanding is obtained it will be clear that the instant reissue application clearly provides support for the claims copied from the '414 patent.

The embodiment illustrated in this reissue application's figure 10 is described fairly comprehensively from column 16, line 38 to column 20, line 14. The effective alkali concentrations (EAs) shown in figure 10 are the EAs at the respective screen assemblies, not the EAs in the treatment zones between the screens. Typically, treatment liquid EA concentrations can only be obtained where liquid is removed from the vessel, that is, at the screen assemblies. Though these EAs are a function of the EAs present during treatment, these are not the EAs to which the material is exposed in the respective treatment zones.

First, the EA of 20-30 g/l at screen 95 is representative of the high EA in the zone above screen 95 (for example, the EA of about 25-35 g/l shown in figure 10) and the much lower EA of the wash liquor 11 introduced to the bottom of the digester via conduit 42. In the embodiment shown, these two sources of EA are mixed to yield an EA in the vicinity of screen 95 of about 20-30 g/l. In general, with the introduction of wash liquor at the bottom of the digester and the counter-current flow of liquid indicated by the

upwardly directed arrow above screen 95, the treatment liquid in this zone varies from about 20-30 g/l at screen 95 to about 25-35 g/l at screen 85. As noted at column 18, lines 21-22, the EA in the zone below screen 85 may be as high as 60 g/l.

Between screens 81 and 85 of figure 10, this reissue application treats the material in a co-current fashion with a relatively uniform EA of at least about 25-35 g/l (as indicated by the identical ranges of EA at screens 81 and 85). As noted above, this reissue application notes that the EA in this zone may be as high as 60 g/l. This zone between screen 81 and 85 is the zone of relatively high EA treatment according to the claimed invention, not the zone below screen 85. The source of this higher EA is introduced at screen 81 via conduits 49, 437, and 83.

Above screen 81, the material is treated with liquid having an EA which varies from about 25-35 g/l at screen 81 to about 4-8 g/l at screen 80. Note that the treatment here is counter-current as shown by the upwardly directed arrow between the two screens 80, 81. The EA typically decreases as the liquid moves upward. The EA of the treatment zones above screen 80 is provided by the "first portion" of cooking liquid. As shown, at the top of the vessel the EA of the treatment is between about 20-25 g/l and then is consumed during "pre-treatment" to about 4-8 g/l. Somewhere between screens 80 and 81, the material is exposed to cooking conditions at an EA somewhere between 4-8 g/l and 25-35 g/l to "obtain a first effective alkali concentration". As described at column 17, line 44 through column 18, line 2, the temperature in this "impregnation zone" may be as high as 170°C (see column 17, line 62). As noted above, "cooking" is typically considered to begin at a temperature of about 140°C. That is, somewhere

above screen 81 in the digester of figure 10, "cooking" at a temperature above 140°C and at "a first effective alkali concentration" commences. Then, at or below screen 81, the material being treated is exposed to a "second effective alkali concentration being between about 8 g/l and 120 g/l greater than the first effective alkali concentration". For example, if the EA during treatment above screen 82 is 8 g/l and the EA during treatment below screen 82 is 35 g/l, the difference is 27 g/l. Also, if the EA above screen 82 is 25 g/l and the EA below screen 85 is 60 g/l, the difference is 35 g/l; or if 8 above and 60 below, the difference is 52 g/l. Thus, the disclosure of figure 10 also does indeed support the present claims.

With respect to the allegation in sub-paragraph 3) of the dependent claims copied from the '414 patent are also not provided in the disclosure of the reissue application (of the '856 patent), absolutely no detail as to why the features are not shown has been set forth in the previous Action. As described in great detail in Attachment A to the preliminary remarks of March 21, 2000 filed in this case, it is clear that the details of the dependent claims clearly are found in the reissue disclosure. Therefore it is believed that all of the claims copied from the '414 patent are clearly supported by the specification of this reissue application, and that there is no new matter, and therefore both of the 35 USC §112 and 35 USC §251 rejections are inappropriate.

With respect to the first full paragraph on page 5 of the Action requesting the calculation of the H-factor, applicant provides herewith the following information:

It should firstly be pointed out that the H-factor of each stage depends on time and temperature. In the reissue application and in the '414 patent the alkali concentrations are important and the times, temperatures, and H-factors are not as important and can vary widely. To simplify the situation, it can be assumed that when the same cooking temperature applies during step b) of claim 1 of the reissue application, and when the temperature is constant the H-factors are proportional to time:

Total time, min	High EA time, min	High EA H-factor, %
Claim 1: 30-240	1	3.3-0.4
Claim 2: 30-240	15	50-6.3
Claim 3: 30-240	30	100-12.5

If the temperature is also varied, the fraction of high alkalinity stage H-factor may vary from one to 99%. This clearly indicates that the H-factor limitations of the claims copied from the '414 patent are not novel, and such H-factors are inherent in the disclosure of this reissue application.

To explain more fully, that the H-factor is a function of time and temperature is supported by the attached excerpt from Smook (page 86) and, more completely, in the excerpt from Grace (pp. 49-54). As noted in the marked-up section on page 52 of Grace, the H-factor for a pulping process is typically calculated by a "numerical procedure" which is dependent upon the time vs. temperature "cooking schedule" of the process used. A typical cooking schedule is illustrated by the upper curve in figure 42 on page 54 of Grace. A typical numerical procedure used to calculate H-factor is shown in Table 16 on page 53 of Grace. Clearly, as illustrated by the cooking schedule shown in figure 42 and the numerical calculations shown in Table 16 of Grace, the "percent of total H-factor" at any stage in a cooking process is a function of the elapsed time and

temperature of the stage relative to the time and temperature of the entire process, that is, relative to the "cooking schedule" of the entire process. To simplify the calculation of percentage of total H-factor, the temperature of the process can be assumed constant.

With a constant temperature, the relative H-factor for a stage of treatment is proportional to the time of treatment. That is, with the temperature assumed constant, by knowing the relative length of a portion of the cooking process with respect to the entire length of time of the cooking process, the percentage of the H-factor of the portion of the process relative to the entire process can be calculated. Note that in the "cooking schedule" shown in figure 42 on page 54 of Grace, the temperature after about one and one-half hours of treatment is a constant 170°C. Since the "relative reaction rate" shown in the bottom figure of figure 42 of Grace is essentially zero (that is, essentially no cooking is occurring at temperature less than 130°C), the contribution of the treatment in the first one and one-half hours – during the rise in temperature to 170°C – to the total H-factor is essentially negligible for this cooking schedule. As a result, for the cooking schedule shown in figure 42 of Grace, the percentage of H-factor for a portion of the total process can be calculated by simply calculating the ratio of the time of the portion to the total time of treatment.

From claim 1 (and column 4, line 57 through column 5, line 3), this reissue application discloses that the cooking is performed "for more than thirty minutes". At column 18, lines 7 and 8, this reissue application teaches that "[t]he treatment time in the cooking zone varies from 0.1 to 4 hours, and preferably is more than thirty minutes." That is, the treatment time may be six minutes (0.1 hours) to 240 minutes (that is, four

hours). Again, from claim 1 (and column 4, line 57 through column 5, line 3), step (b), the "high-alkali" treatment, may be one minute long; from claim 2, may be 15 minutes long; and from claim 3, may be 30 minutes long. The ratio of the first stage treatment time to the total time of the cook corresponds to the percentage of H-factor for the first treatment stage. The length of the first treatment stage can be computed by subtracting the length of the second treatment stage from the total treatment time. For example, for a total cooking time of 30 minutes and a second stage cooking time of one minute, the percentage of H-factor for the first stage is

$$\frac{\text{Total time} - \text{time of second stage}}{\text{Total time}} \times 100 = \frac{30 \text{ minutes} - 1 \text{ minute}}{30 \text{ minutes}} \times 100 = 96.67\%$$

Other percentages of total H-factor for the total times and second stage treatment times specified by this reissue application based upon the above equation are summarized in the table below.

Percentage of Total H-Factor
of the First Stage of This Reissue Application

Total Cooking Time (minutes)	Second Stage Time (minutes)		
	1	15	30
30	96.7%	50%	0%
120	99.2%	90%	75%
240	99.6%	93.8%	87.5%

Of course, many other percentages of the total H-factor can be calculated for the intermediate cooking times and higher second stage treatment times. These percentages of H-factor that can be calculated from the data supplied in this reissue application clearly disclose the 30 to 99.5% of the total H-factor claimed by the '414 patent for the first stage of their process.

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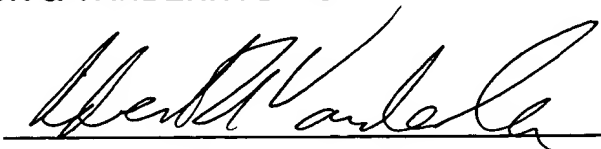
Clearly, the percentage of H-factor claimed by the '414 patent is inherent in the teachings of this reissue application. Anyone of ordinary skill in the art would be able to calculate these same relative percentages given the information provided by this reissue application and being familiar with the significance of H-factors and their calculation.

In conclusion, it is believed that the application is in clearly in proper form, and all of the claims copied from the '414 patent are clearly explicitly or implicitly supported by the disclosure of this reissue application. Therefore early passage to issue is earnestly solicited.

Should any small matters remain outstanding it is requested that the undersigned attorney be given a call so that such matters may be worked out and the application placed in condition for allowance without the necessity of another Action and amendment.

Respectfully submitted,

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